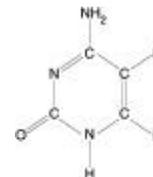


**INTERAGENCY ANNOUNCEMENT OF OPPORTUNITIES IN
METABOLIC ENGINEERING**

NSF 99-85



Introduction

This Announcement describes a collaborative effort among the Department of Agriculture, Department of Commerce, Department of Defense, Department of Energy, Environmental Protection Agency, the National Aeronautics and Space Administration, and the National Science Foundation. A parallel funding effort by the National Institutes of Health for Metabolic Engineering is referenced below under ADDITIONAL OPPORTUNITIES. The intent of this Inter-Agency Announcement is to:

1. Introduce an Inter-Agency collaborative R&D effort in the area of Metabolic Engineering as coordinated through the National Science and Technology Council. Seven Agencies will make available up to \$3M annually from current research funding (including agency in-kind support ie, equipment, laboratory space, personnel time, materials, etc.) in support of this Announcement. There will be annual competitions to support new Metabolic Engineering projects over the next five years. The parallel effort at NIH provided \$2.4M of support for Metabolic Engineering in FY 1998.
2. Draw attention to federal R&D interests and opportunities in Metabolic Engineering.

Background

The annual Federal R&D effort of approximately \$70 Billion is coordinated through the four committees of the National Science and Technology Council chaired by the President. One of these committees is the Committee on Science, which deals primarily with basic research, including responsibilities to provide stewardship for Federal expenditures on biotechnology and to provide guidance and policy for the national effort in this area. This is done through the Subcommittee on Biotechnology of the Committee on Science.

The Subcommittee on Biotechnology is composed of Federal research scientists and managers from all of the agencies supporting biotechnology research. Recently, the Subcommittee on Biotechnology released the report "Biotechnology for the 21st Century: New Horizons," that identifies research priorities and opportunities in biotechnology. One of the research priorities addressed the need for a better understanding of metabolic pathways and metabolic engineering in living systems. To stimulate increased awareness and attention to this field, the Subcommittee on Biotechnology established a Metabolic Engineering Working Group. This Working Group has already held three interagency workshops on the subject and now, via this Announcement, broadens the participation and information exchange in the research community.

Purpose

In an effort to support a more coordinated effort of Federal Metabolic Engineering R&D interests, and to identify new R&D opportunities in Metabolic Engineering for Federal Government involvement, the Working Group on Metabolic Engineering is calling for research proposals in Metabolic Engineering.

For purposes of this Announcement, Metabolic Engineering (ME) is defined as follows: emerging approach to the understanding and utilization of metabolic processes. As the name implies, ME is the targeted and purposeful alteration of metabolic pathways found in an organism in order to better understand and utilize cellular pathways for chemical transformation, energy transduction, and supramolecular assembly. ME typically involves the redirection of cellular activities by the rearrangement of the enzymatic, transport, and regulatory functions of the cell through the use of recombinant DNA and other techniques. Much of this effort has focussed on microbial organisms, but important work is being done in cell cultures derived from plants, insects, and animals. Since the success of ME hinges on the ability to change host metabolism, its continued development will depend critically on a far more sophisticated knowledge of metabolism than currently exists. This knowledge includes conceptual and technical approaches necessary to understand the integration and control of genetic, catalytic, and transport processes. While this knowledge will be valuable as fundamental research, per se, it will also provide the underpinning for many applications of immediate value.

Topic Descriptions

Proposals are invited that describe enabling technologies useful for the study of metabolic processes and metabolic engineering. Three areas are of particular interest, although others may be considered:

- Instrumentation, sensors, new analytical tools, and new cell and molecular biology methods which facilitate the study of metabolic pathways, especially those technologies that allow the examination of individual cells.
- Quantitative and conceptual models integrated with experimental studies that better characterize the regulation and integration of complex, interacting metabolic pathways.
- The use of bioinformatics to deduce the structure, function, and regulation of major metabolic pathways.

Multi-disciplinary projects are being sought in the above areas. It is desirable that such projects take advantage of the opportunity for synergistic interactions between at least two of the participating Agencies.

SUBMISSION PROCESS

Responses to this Announcement will involve a mandatory two-step process: Pre-Proposals and invited Full Proposals.

A Pre-Proposal shall be submitted by an individual investigator (serving as the "lead" investigator for two or more collaborating investigators). No institutional signatures are required on Pre-Proposals. Pre-Proposals must follow the format described below.

Invitations for submission of Full Proposals will be extended to certain authors of Pre-Proposals after review of the Pre-Proposals (see below). Academic and Non-Profit Institutions, Industrial Organizations, and Government (Federal, State, and Local) Laboratories, are eligible to submit Full Proposals.

PRE-PROPOSAL FORMAT

Investigators are strongly encouraged to discuss their idea for a Pre-Proposal with a member(s) of the Metabolic Engineering Working Group (MEWG) (see Agency Contacts listed at the end of this Announcement). They should then submit a brief Pre-Proposal that allows the MEWG to evaluate the programmatic relevance and significance of their Metabolic Engineering idea. The Pre-Proposal, in three or fewer pages of text, should contain a description and explanation of the idea, an assessment of its novelty and importance, and the approach proposed to test the idea. The Pre-Proposal should also provide a brief non-itemized budget estimate for the project [a rough guideline is funding up to \$125K (total costs, ie. direct and indirect costs), and/or agency in-kind support] per year per investigator. A typical project duration would be up to three years.

In addition to the pages of text, each Pre-Proposal must include a Curriculum Vitae for each of the Investigators, which should not exceed two pages for each Investigator.

PRE-PROPOSAL SUBMISSION

An original and twenty (20) copies of the Pre-Proposal must be received by May 17, 1999 and addressed to:

Fred G. Heineken, Ph.D.
Chair, Metabolic Engineering Working Group
Bioengineering and Environmental Systems Division
Directorate for Engineering
Room 565
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230

Pre-Proposals sent by express mail should have the following phone number listed on the express mail label: (703) 306-1319.

Pre-Proposals may be sent by FAX to: (703) 306-0312.

Pre-Proposals may also be sent by e-mail in ASCII (DOS) Code to: fheineke@nsf.gov

Investigators will be notified by June 15, 1999, if they are or are not to be invited to submit Full Proposals.

PRE-PROPOSAL REVIEW

The Metabolic Engineering Working Group will review all Pre-Proposals to see if they:

1. Are consistent with the Topic Descriptions section of this Announcement.
2. Generate enough interest from at least two of the participating Agencies that these Agencies are willing to invite submission of a Full Proposal to their respective Agencies.
3. Integrate multi-disciplinary sciences and engineering in the solution of key problems in Metabolic Engineering.

Investigators whose Pre-Proposals do not meet these criteria will not be invited to submit Full Proposals and their Pre-Proposals will not be considered any further under this Announcement. However, this does not exclude these investigators from sending a proposal on Metabolic Engineering to an Agency for review by that Agency outside of this Announcement.

FULL PROPOSAL SUBMISSION

Investigators whose Pre-Proposals meet the Pre-Proposal review criteria will be invited to submit Full Proposals. Since Full Proposals need to be submitted in accordance with the guidelines of each relevant Agency, information concerning regulations, submission dates, review process, and review criteria will be sent to the investigators at the time of Full Proposal invitation. The evaluation criteria that will be used for full proposals are shown in Attachment A.

The estimated amount of funding (including agency in-kind contributions) available for Inter-Agency ME support is up to \$3M per year. However, Agencies have no obligation to provide this amount of support if the quality of the proposals received does not justify such an expenditure, and/or sufficient funds or Agency in-kind support are not available. In FY 1998, NIH provided \$2.4M of support for Metabolic Engineering projects.

ADDITIONAL OPPORTUNITIES

For authors interested in submitting proposals on Metabolic Engineering to the National Institutes of Health (NIH), there is a separate Program Announcement (95-087) issued by the National Institute of General Medical Sciences (NIGMS) and the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) on Metabolic Engineering; this opportunity is described in more detail at the following web site: <http://www.nih.gov/nigms/funding/pa>

Applications for funding from the U.S. Department of Commerce or the National Institute of Standards and Technology (NIST) outside of the Advanced Technology Program (ATP) competitions should follow the guidance provided in this Announcement. For proposers interested in submitting proposals on Metabolic Engineering to ATP within NIST, the following application information MUST be used: The pre-proposal format described above for all other agencies, WILL NOT be accepted for application to the ATP Program. The ATP provides funding on a cost-shared basis to industry to carry out research and development on high-risk, high-payoff emerging and enabling technologies. ATP concentrates on those technologies that offer significant, broad-based benefits to the nation's economy but that are not likely to be developed in a timely fashion without the ATP's support because of the technical risks involved. Projects are proposed by industry and awards are made on the basis of announced competitions that consider the technical and business/economic merits of the proposed projects. Starting this year, the ATP will accept a specific pre-proposal format throughout the year and proposers are encouraged to use this option to help prepare for submitting a full proposal in either FY1999 or future FY2000 competitions. Written review comments on pre-proposals will be provided in approximately two weeks after receipt of the pre-proposal by the ATP. The ATP does not accept unsolicited proposals. Industry proposers are encouraged to team with universities, small businesses, and federal laboratories (not including NIST) and apply directly to the ATP. The ATP expects to have approximately \$66 million available in FY1999 for first-year funding of new projects.

The ATP announced the start of this competition in the November 16, 1998 Commerce Business Daily (CBD) and on the ATP web site (<http://www.atp.nist.gov>). The deadline for full proposals to the FY1999 ATP competition is 3p.m. Eastern time on Wednesday, April 14, 1999. ATP application kits for submitting pre-proposals and full proposals are available on the ATP website and from the ATP via the toll-free ATP hotline: 1-800-ATP-FUND, or by sending an e-mail request to atp@nist.gov. The application kit outlines the technical and economic selection criteria that must be met to successfully compete in an ATP competition. This year, to simplify the application procedure and encourage the broadest participation by industry, the ATP is conducting a single large competition rather than several competitions in different technology areas. The ATP will establish several independent technology-specific selection boards and assign each project proposal for review by the board most qualified to evaluate the proposal's merits."

AGENCY CONTACTS

Additional information may be obtained by contacting:

Department of Agriculture (USDA) :

Jeff Conrad
Phone: (202) 401-6188
jconrad@reeusda.gov

Liang-Shiou Lin
Phone: (202) 401-5042
llin@reeusda.gov

Department of Commerce (DOC):

Vince Vilker
Phone: (301) 975-5066
vincent.vilker@nist.gov

Department of Defense (DOD):

Harold Bright
Phone: (703) 696-4054
brighth@onr.navy.mil

Eric Eisenstadt
Phone: (703) 696-4596
eisense@onr.navy.mil

Alan Rudolph
Phone: (703) 696-2240
arudolph@darpa.mil

Department of Energy (DOE):

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Phone: (202) 586-5618
valerie.sarisky-reed@hq.doe.gov

Greg Dilworth
Phone: (301) 903-2873
greg.dilworth@oer.doe.gov

Daniel Drell
Phone: (301) 903-4742
daniel.drell@oer.doe.gov

Environmental Protection Agency (EPA) :

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Mark Segal
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Barbara Karn
Phone: (202) 564-6824
karn.barbara@epamail.epa.gov

National Aeronautics and Space Administration (NASA):

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Phone: (202) 358-0647
sdavison@hq.nasa.gov

National Science Foundation (NSF):

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fheineke@nsf.gov

George Vermont
Phone: (703) 306-1320
gvermont@nsf.gov

For the parallel NIH effort:

National Institutes of Health (NIH):

Warren Jones
Phone: (301) 594-5938
jonesw@gm1.nigms.nih.gov

For the DOC ATP effort:

Department of Commerce (DOC):

Robert Bloksberg-Fireovid
Phone: (301) 975-5457
robert.b-f@nist.gov

ATTACHMENT A

Evaluation Criteria for Full Proposals

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work). To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g. gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Additional Factors to be Considered by NSF

For those Pre-Proposals where NSF has expressed an interest, NSF will consider the following additional factors in making awards:

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learner perspectives. Principal Investigators should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens—women and men, underrepresented minorities, and persons with disabilities—is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports. Principal Investigators should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

ADDITIONAL INFORMATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Grantees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities, and persons with disabilities to compete fully in its programs. In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement or contact the program coordinator at (703) 306-1636.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation regarding NSF programs, employment, or general information. TDD may be accessed at (703) 306-0090 or through FIRS on 1-800-877-8339.

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Reports Clearance Officer; Information Dissemination Branch, DAS; National Science Foundation; Arlington, VA 22230.

YEAR 2000 REMINDER In accordance with Important Notice No. 120 dated June 27, 1997, Subject: Year 2000 Computer Problem, NSF awardees are reminded of their responsibility to take appropriate actions to ensure that the NSF activity being supported is not adversely affected by the Year 2000 problem. Potentially affected items include: computer systems, databases, and equipment. The National Science Foundation should be notified if an awardee concludes that the Year 2000 will have a significant impact on its ability to carry out an NSF funded activity. Information concerning Year 2000 activities can be found on the NSF web site at <http://www.nsf.gov/oirm/y2k/start.htm>.

National Science Foundation programs described in this publication fall under categories in the latest Catalog of Federal Domestic Assistance issued by the Office of Management and Budget and the General Services Administration: 47.041 - Engineering.

OMB # 3145-0058

NSF 99-85 (Replaces NSF 98-49)
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